

# Terminology for eHR

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eHR Information Standards Office

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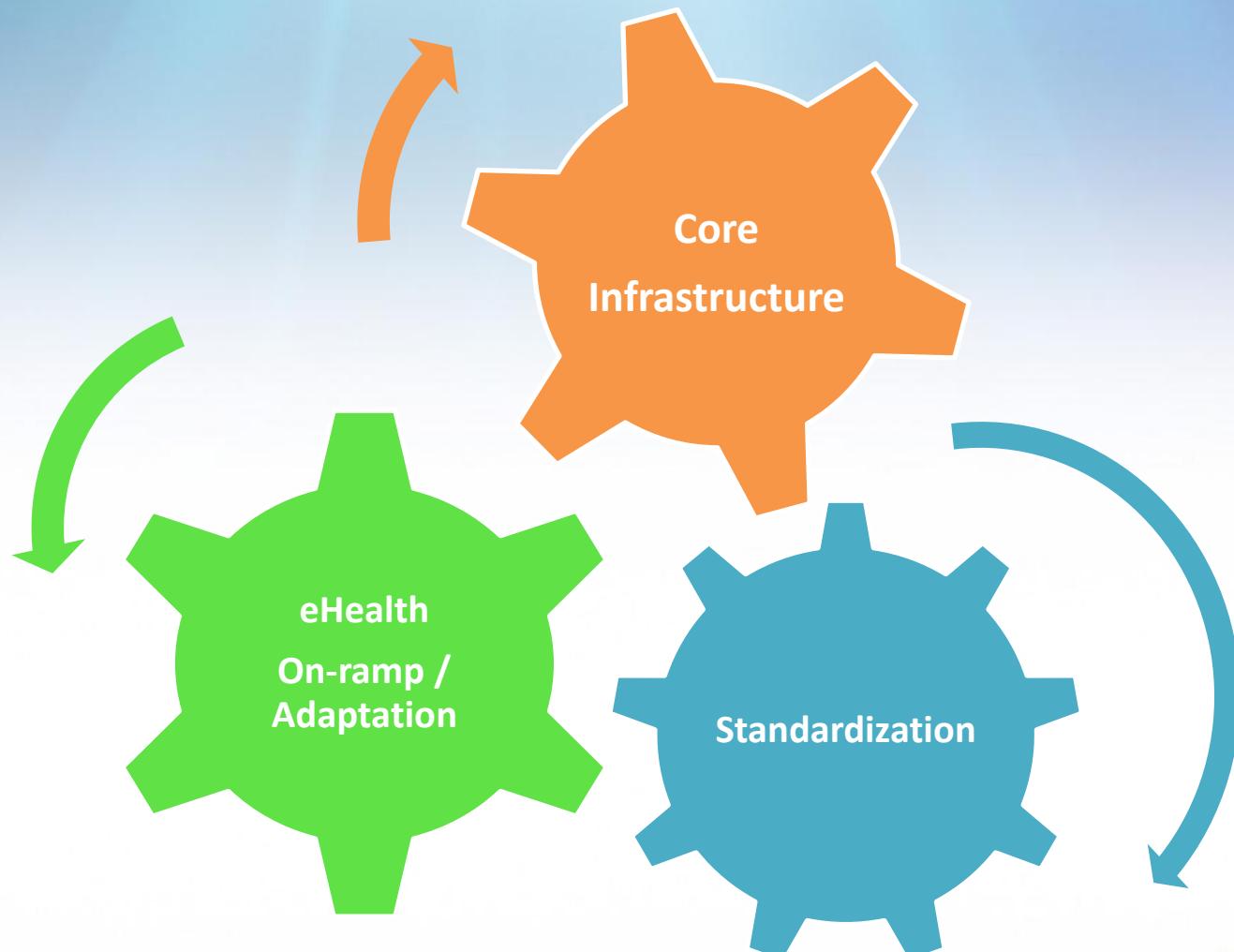


# Discussion

- Introduction to Terminology
- Terminology for eHR
- Terminology in practice

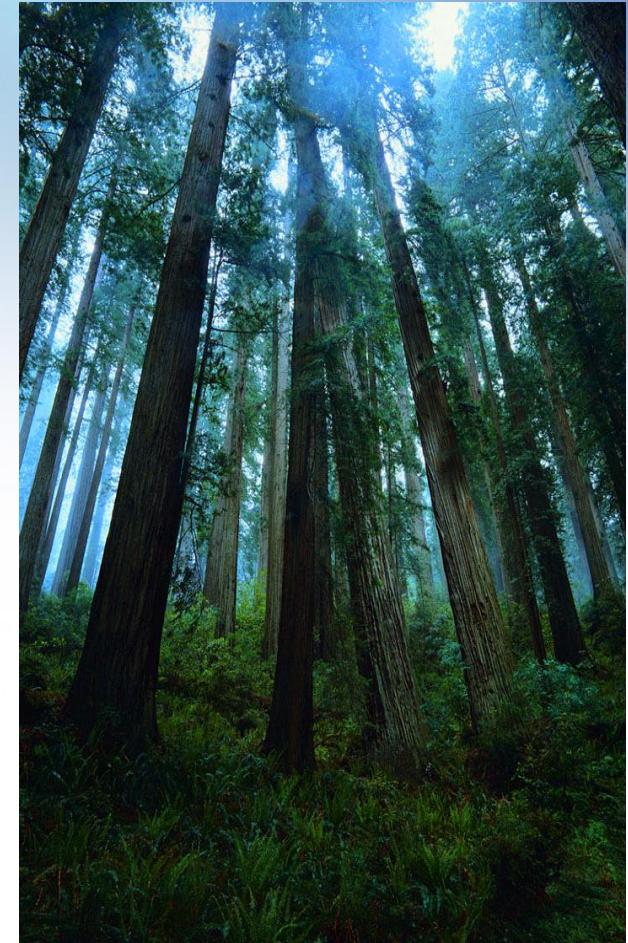


# eHR Components



# Areas

- Registries
  - Patient
  - Practitioner / Institute
  - Location (address)
- eHR content
- Terminology ←
- Messaging
- Management process



# Clinical Documentation

20/10/95 *Jungard V/H*

- C/O ventilated & enlarged
- Dyspnoeaic / RR 23/min
- exerted loaded

*Plan*

- blood tests:  
Hep B +ve  
PT 12.7  
platelet 61  
AFP 5  
albumin 37, ALT 46, bilirubin 32  
normal FBS and lipid

echocardiogram (Mar 04): normal LV, MV mildly thickened with mild MS and MR, AV mildly thickened with mild AR, increase LA size

no major symptom  
seldom drinks  
no bleeding tendency  
no fluid overload

149/87, P:73  
PE:  
multiple lipomas over the body a.  
obese abdomen, difficult to palp.  
no bleeding tendency  
no fluid overload

149/87, P:73  
PE:  
multiple lipomas over the body a.  
obese abdomen, difficult to palp.

Hep B related cirrhosis  
?Madelung's disease

**Plan of Management:**  
note BP next time  
refer liver clinic  
check LFT, AFP, CBP, HBeAg before

**Physical Exam** | Social History | Risk Assessment | Functional Assessment (FAS) 1 | FAS 2 | FAS 3 | FAS 4

**Vital Signs and Observations**

Temp: [ ] °C Tympanic  Unrecordable

Pulse: [ ] /min Brachial  Unrecordable

Pattern: [ ] Pacemaker:  Yes  No

BP: [ ] / [ ] mmHg Mean BP: [ ] mmHg  Unrecordable

Position: [ ]

CVP: [ ] CVP level:  Swing  Not Swing

RR: [ ] /min  Unrecordable

Spo<sub>2</sub>: [ ] % O<sub>2</sub> Therapy:  Yes  No

Coughing:  Yes  No

Sputum:  Yes  No Amount: [ ] Colour: [ ]

**Body Measurement**

Weight: [ ] kg Height: [ ] cm BMI: [ ]

10% weight loss within 6 months prior to admission

**Urinalysis**

Sugar  
Albumin  
Ketone  
**Other Meds**  
Pregnancy  
Blood Glucose  
Pain: [ ]

**Select Diagnosis**

Category Classify Keyword <> Move Close

diagnoses (13)

Keyword: gout

Code: [ ] Find

274.9 Gout
274.0 Gouty arthropathy
274.0 Gouty arthritis
274.0 Gouty Tophi
274.0 Gouty arthritis, primary
274.0 Gouty arthritis, secondary
274.0 Gouty arthritis 2nd renal impaire
274.10 Gouty nephropathy
274.81 Gouty tophi of ear
274.82 Gouty tophi site nec
274.89 Gouty iritis
274.89 Gouty neuritis
V77.5 Screening for gout

Total: [ ]

Ready VH MEDI

Gout

Add Dx/Px

NHS/NGT



# Free Text Data

- Same word, different meanings
  - COLD, MI, diabetes, fundus
- Different words, same meaning
  - Oral, per oral, by mouth, P.O, orally
- Context dependent
  - Current compliant, past medical history, family history
- Negation
  - Explicit, e.g. denied chest pain
  - Implicit, e.g. clear lung
- Uncertainty
  - Probably, suggest, possible, likely
- Lexical variant
  - Anaemia vs anemia, hepatic vs liver



# Terminology

- A finite, enumerated set of terms used to convey information unambiguously (a controlled vocabulary)
- Encode medical information so that computers can process the data easily
- Reduce complexity by restraining content (what can be said) and syntax (how it is said)

# Purposes of Terminology

- Encode clinical information
- Facilitate the storage of clinical information
- Support sharing and reuse of clinical information
- Support efficient query formulation
- Create a natural language output from manual structured input
- Support the application of decision support algorithms

# The World of Terminology

- There are so many of them:
  - Diagnosis/signs and symptoms - ICD9CM, ICD10, ICD10CM, ICD10AM, ICD-O, ICPC, ICF, SNOMED CT, Read Codes, MedDRA, CTCAE, WHOART, MEDCIN, DSM
  - Procedures - CPT, CDT, HCPCS, OCPS, SNOMED CT, ICD9CM, ICD10-PCS
  - Nursing - NANDA, NIC, NOC, OMS, HHC
  - Diagnostic tests - LOINC, UltraSTAR
  - Drugs - VANDF, NDC, RXNORM, NDDF
  - Medical devices - UMDNS, GMDN, SPN
  - Genomics - GO, HUGO, NCBI Taxonomy
  - ...

# Standard Terminologies

- Numerous standards
  - Each serving a particular purpose
  - Reference for health informatics products, e.g. First DataBank
- No single terminology covers all domains
- Unavoidable mapping for various purposes / system design
  - Well management is needed
- Standard terminologies being updated regularly
  - Impact on data retrieval
    - Analysis / decision support / rules.....
- Handling post-coordinated terms
- Implications
  - Select a few commonly adopted terminologies – each with sufficient breadth & depth of individual / several domains
  - Management for ongoing updates



# Recognised Terminologies in eHR

- Registered Pharmaceutical Products (RPP)
- Hong Kong Clinical Terminology Table (HKCTT)
- International Classification of Diseases, 10th Revision (ICD 10)
- International Classification for Primary Care, 2<sup>nd</sup> Edition (ICPC2)
- Logical Observations, Identifiers Names and Codes (LOINC)
- Systematized Nomenclature of Medicine, Clinical Terms (SNOMED CT)

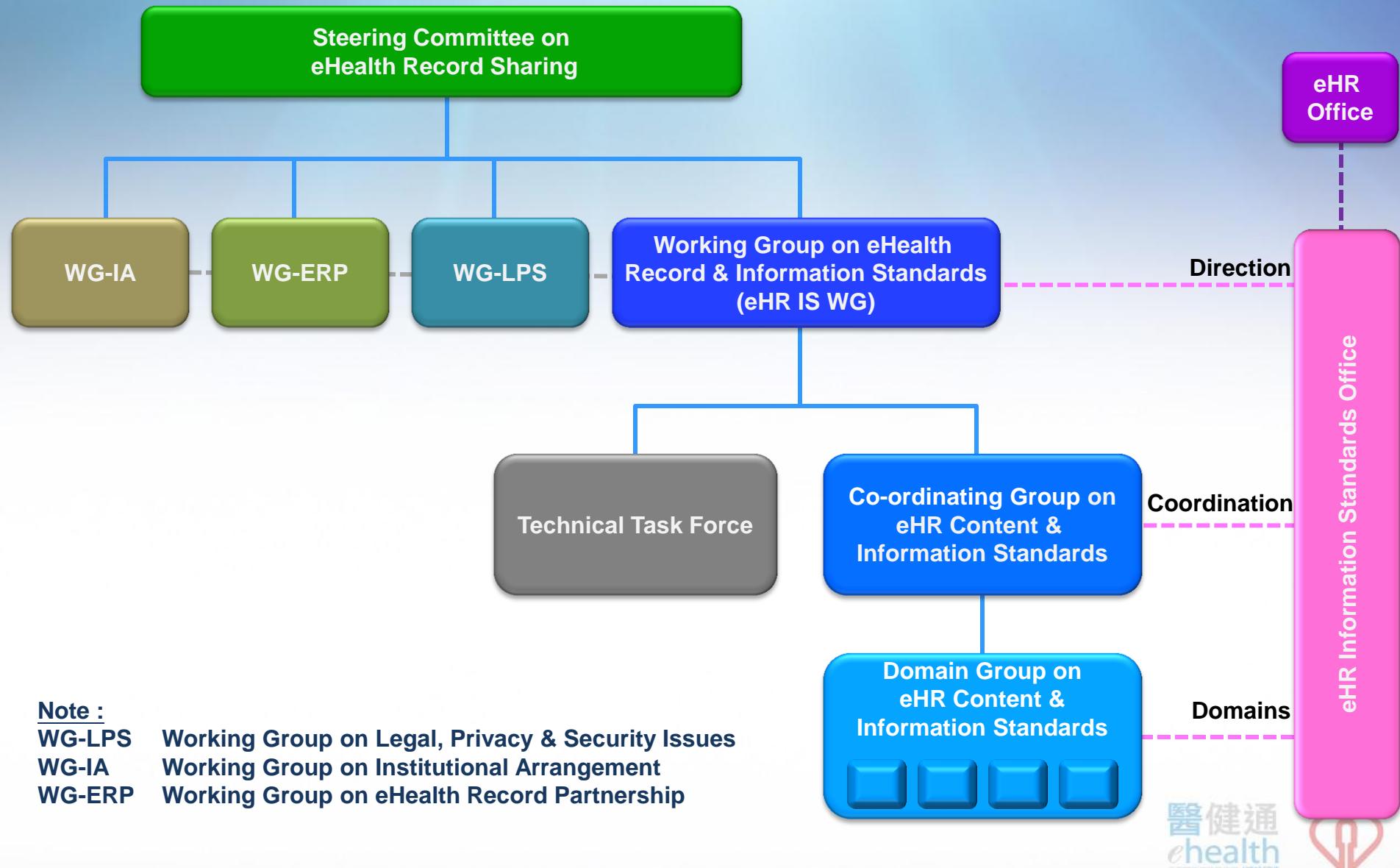
# Recognised Terminologies for HKCTT

Reference Terminology	HKCTT Nature					
	Diagnosis	Procedure	Organism	Specimen	Laboratory Test	Drug
RPP						Yes *
ICD-10	Yes *					
ICPC-2	Yes	Yes				
LOINC #					Yes *	
SNOMED CT #	Yes *	Yes *	Yes *	Yes *	Yes	Yes

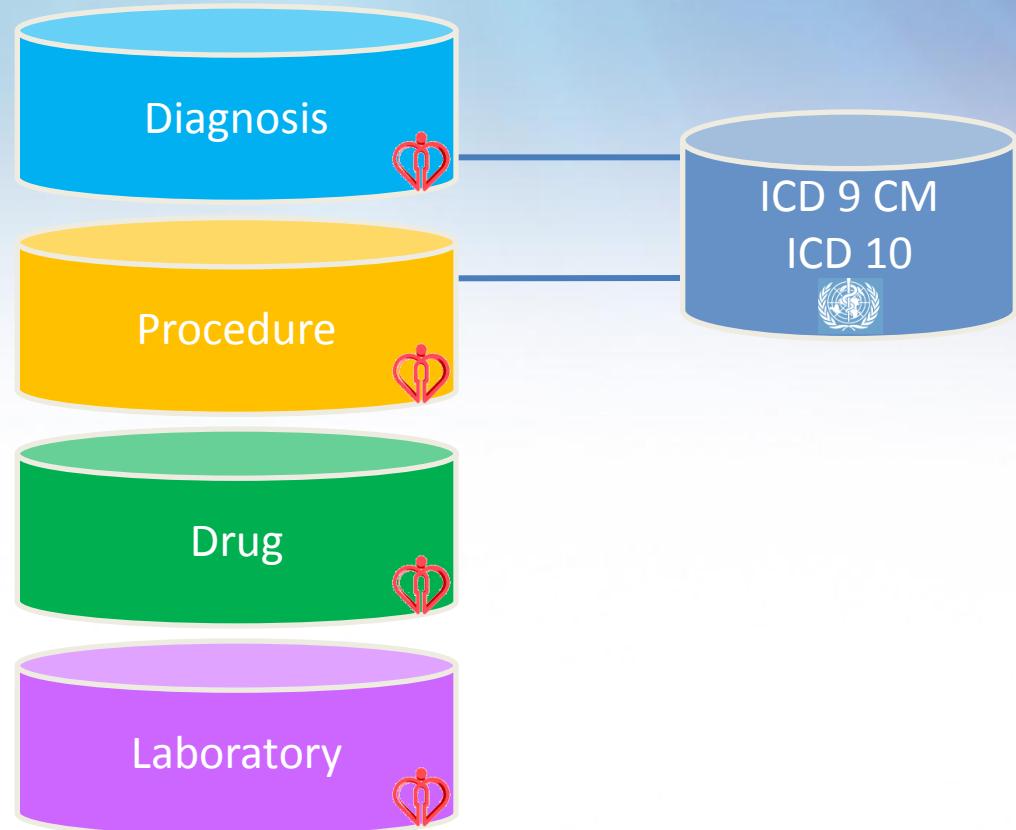
\* Mandatory mapping

# Local extensions created

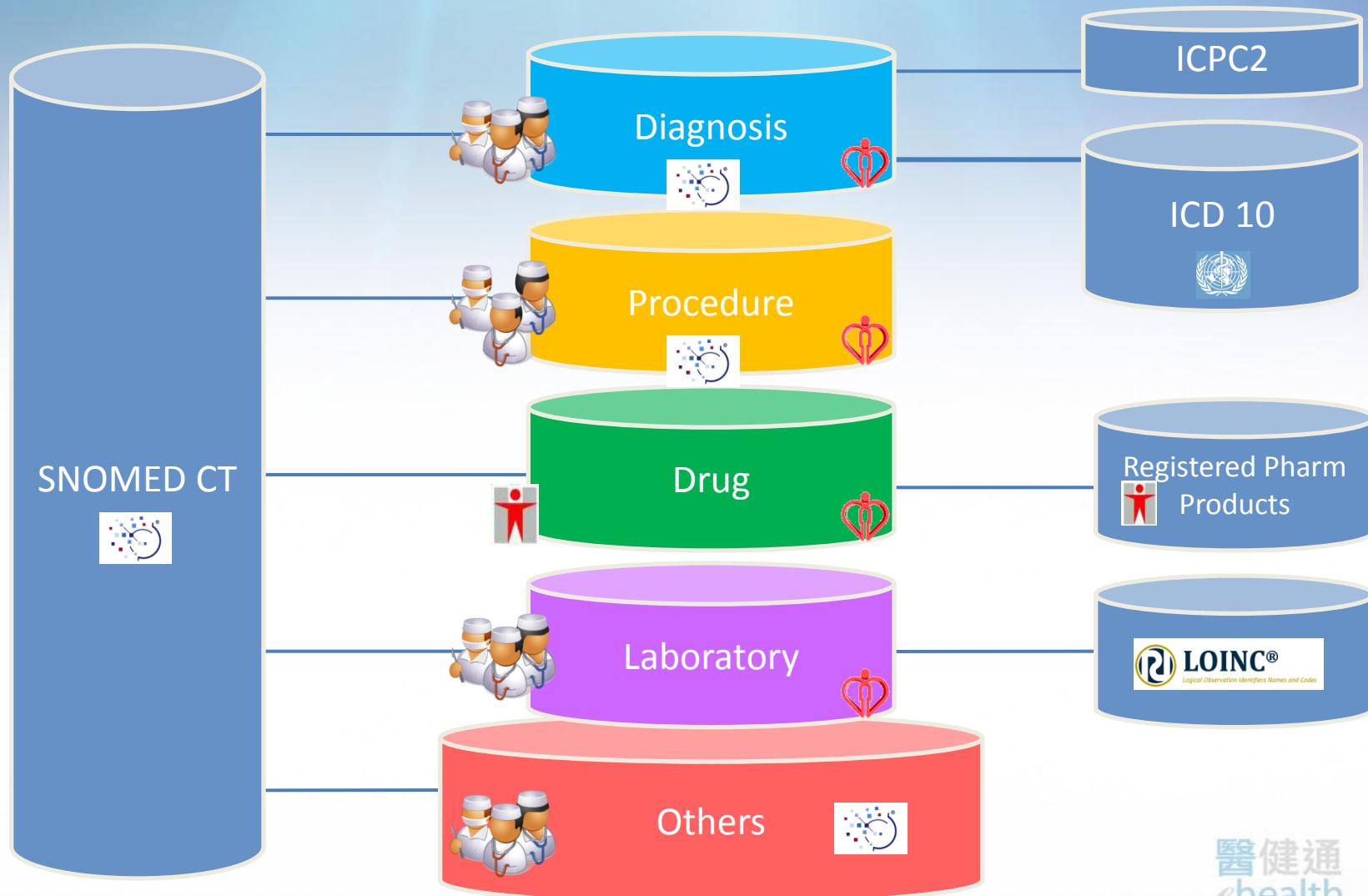
# Organisation Structure for eHR Information Standards



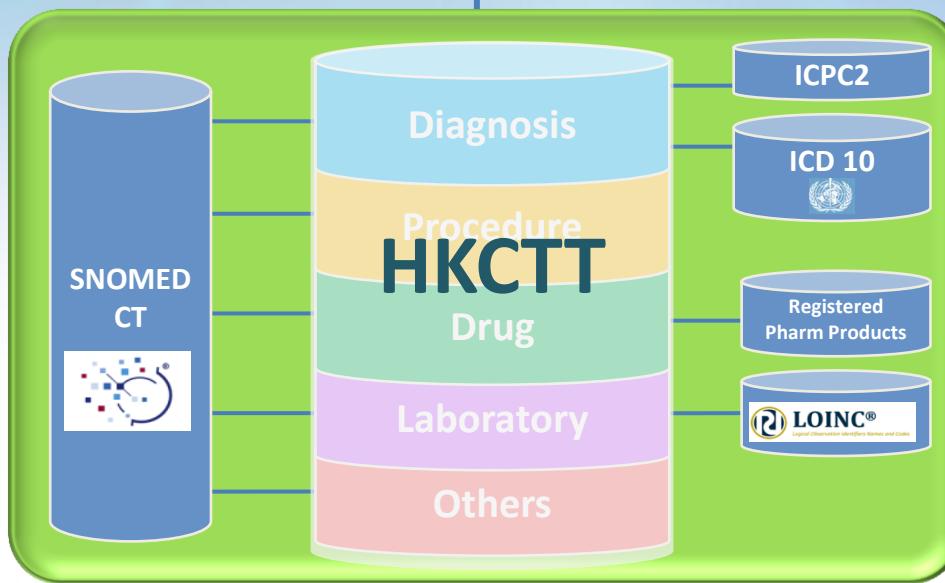
# Hospital Authority Clinical Vocabulary Table (HACVT)



# Building HKCTT

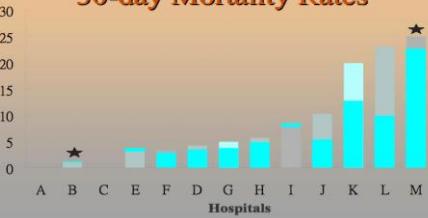


# HKCTT



## Secondary Use

Whipple's Operation  
30-day Mortality Rates



Clinical Data Repository

eHR

The screenshot shows the eHR interface with several panels: "Viewer" (Participant Profile, HD PPP, PEP, PWD, PWD000001, Date: M), "Allergy" (list of allergies), "Current Drugs" (list of medications), "Recent Schedule" (list of recent schedules), and "Immunization Records" (list of immunizations). The "Viewer" panel includes a "Last Entry" section with a date of 21-Aug-2012 and a "Description" of "Chest & Abdomen".

# Adoption of Health Information Standard



# COAD

## CMS On-Ramp

Diagnosis

Attending Reason

<input checked="" type="checkbox"/>	Diagnosis	
<input checked="" type="checkbox"/>	COAD	
	Chronic obstructive pulmonary disease	
	Chronic obstructive asthma (with obstructive pulmonary disease)	
	Chronic obstructive asthma (with obstructive pulmonary disease), with status asthmaticus	
	Chronic obstructive bronchitis	
	Chronic obstructive bronchitis with acute exacerbation	
	Chronic obstructive pulmonary respiratory infection	

Proc

Pres

## HKCTT

Term ID	8519	IN USE	Nature
Full Description	Chronic obstructive pulmonary disease		
Short Description	COPD		
eHR Description	Chronic obstructive pulmonary disease		
Alias	COAD		
	Chronic obstructive airway disease		



# Allergy Checking In CMS On-ramp

## Medication Order Entry

Display

Allergy: amoxicillin (as trihydrate)

Drug Name / Set:

doxacillin|

Prescription

cloxacillin (as sodium) (Vickmans) capsule

flucloxacillin (as sodium) (Athlone) powder for elixir

cloxacillin (*Free Text*)

# Allergy Alert Prompt

## Drug Allergy Checking



This patient has **CERTAIN** drug allergy to **amoxicillin (as trihydrate)**. The clinical manifestation was **angioedema**.

**cloxacillin (as sodium) (Vickmans)** may result in **ALLERGIC REACTION**.

If you wish to prescribe anyway, you must provide the reason(s) for overriding this alert:

- No other alternative available
- Desensitizing the patient with this drug
- Doubts about the report history of drug allergy
- Patient is administering this drug without allergic response
- Patient can tolerate the drug at lower dose
- Others (Please specify reason below)

Remarks

↑  
↓

Prescribe with reason

Do not Prescribe



# Hong Kong Medication Terminology Table

HKMTT

## Drug Checking Information

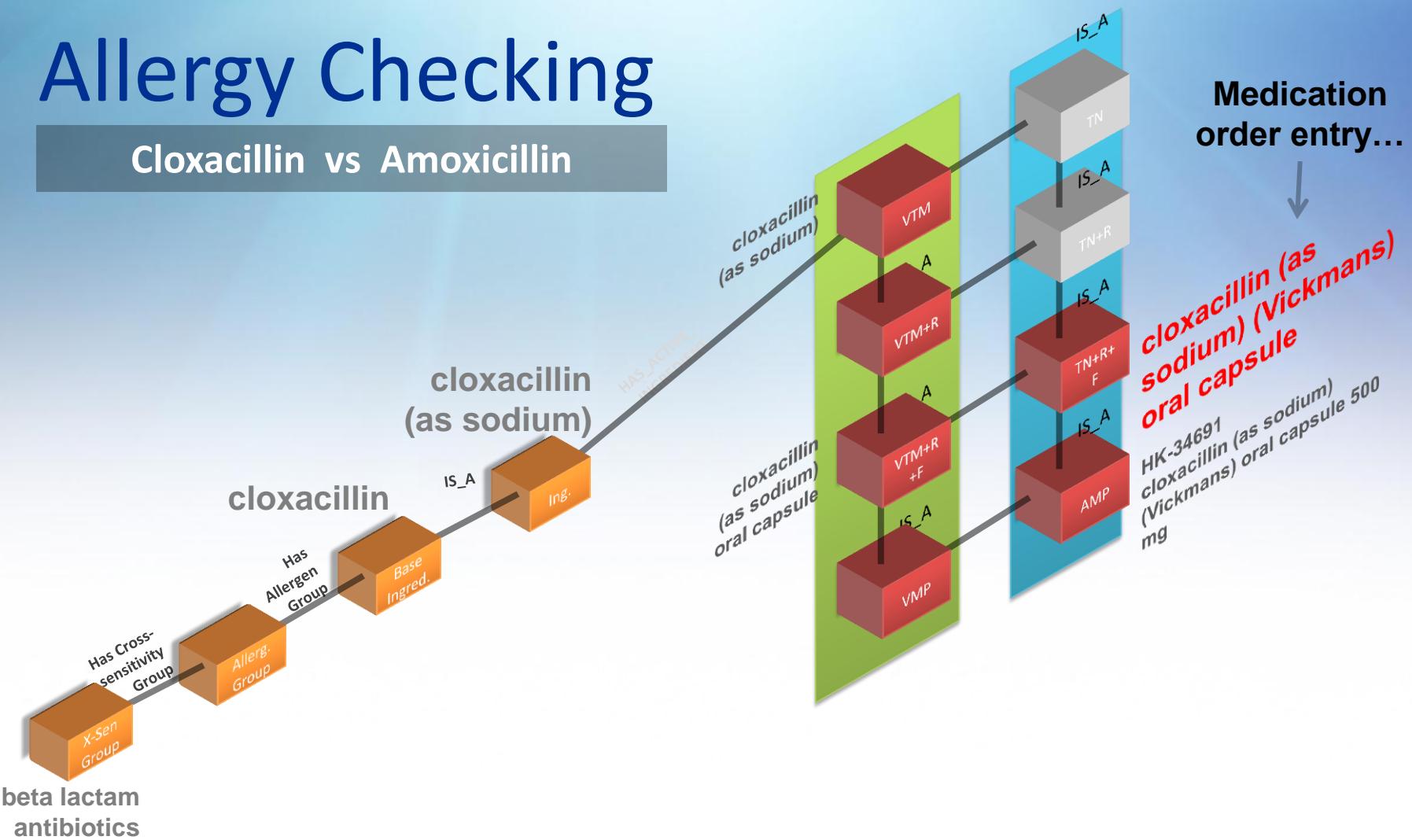
- Active Ingredient
- Base Ingredient
- Allergen Group
- Cross-sensitivity Group

Generic Name	Trade Name
VTM	TN
VTM + R	TN + R
VTM + R + F	TN + R + F
VMP	AMP



# Allergy Checking

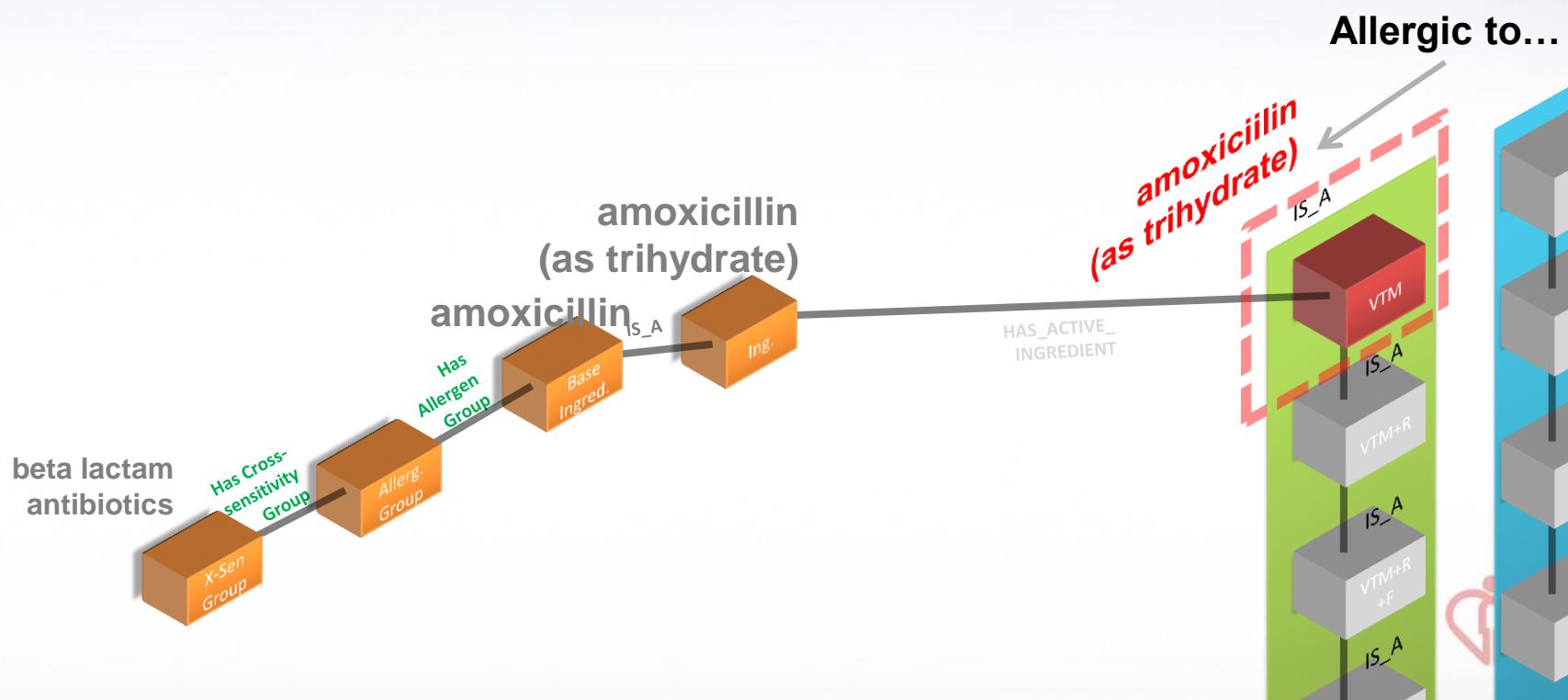
## Cloxacillin vs Amoxicillin



beta lactam antibiotics

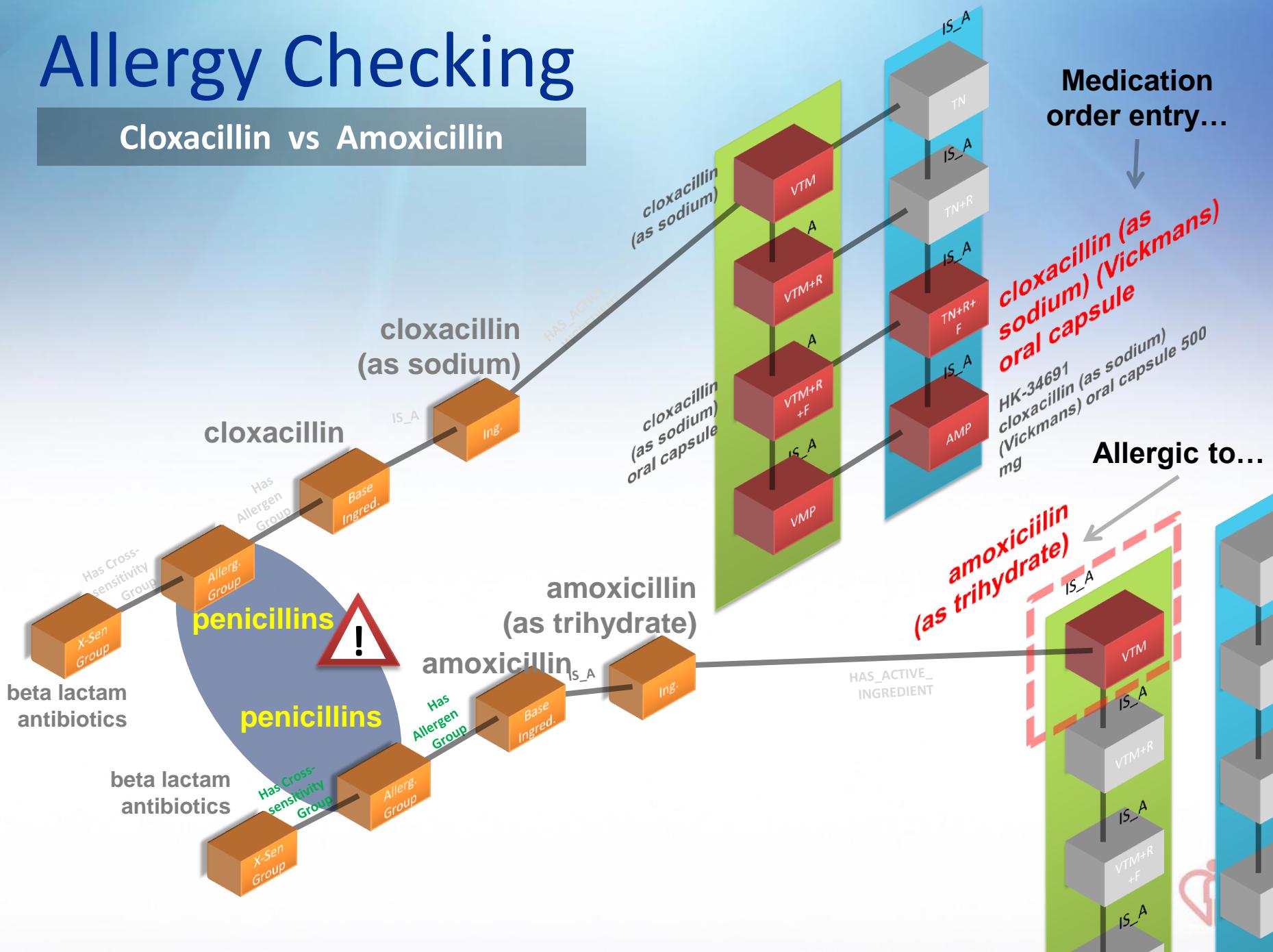
# Allergy Checking

## Cloxacillin vs Amoxicillin



# Allergy Checking

## Cloxacillin vs Amoxicillin



# Laboratory Result in eHR

Hospital Code	TMH	NDH	PWH	AHN	PYN	KWH	PYN
Collect Date	15/01/2011	16/02/2011	18/04/2011	13/05/2011	16/07/2011	11/09/2011	15/11/2011

Bilirubin, Total	6	—	6	4	—	6	13
------------------	---	---	---	---	---	---	----

# Bilirubin, Total in HA

Test Code	Hospital											Total
	A	B	C	D	E	F	G	H	I	J	K	
BIL			1	1						1		3
TB	1						1		1		1	5
TBIL		1			1	1		1				4
TBIL1						1						1
VTBIL								1				1
Total	1	1	1	1	1	2	1	2	1	1	1	17

# Standard vs Local

Hospital Code	TMH	NDH	PWH	AHN	PYN	KWH	NDH
Collect Date	15/01/2011	16/02/2011	18/04/2011	13/05/2011	16/07/2011	11/09/2011	15/11/2011

Presented with Standard Terminology

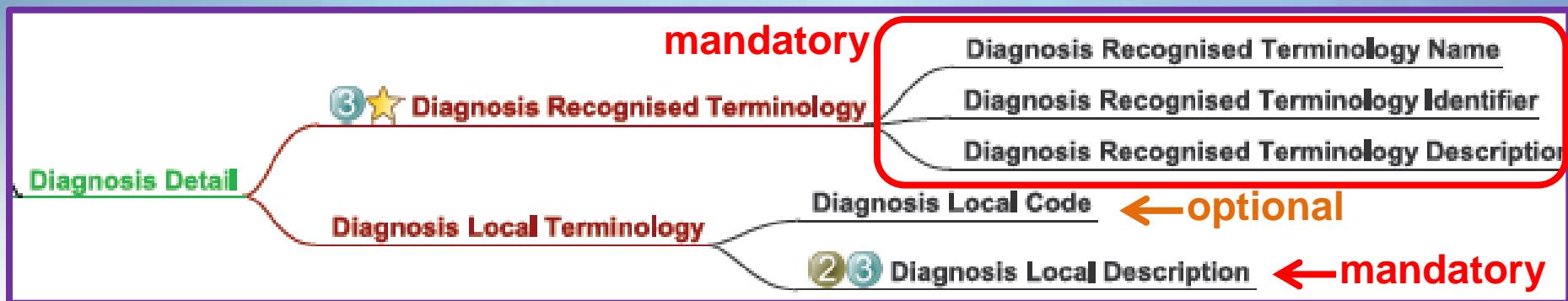
Bilirubin, Total	6	-	6	4	-	6	13
------------------	---	---	---	---	---	---	----

Without Standardisation

	TMH	NDH	PWH	AHN	PYN	KWH	NDH
BIL	6						
BIL							13
TB				4			
TBIL			6			6	

# Set of 5

## Diagnosis – Level 3 Compliance



Example	Rcg T Name	Rcg T ID	Rcg T Des	Local Code	Local Description
1	SNOMED CT	233604007	Pneumonia	----	Pneumonia
2	ICD 10	J18.9	Pneumonia	PN	Pneumonia
3	HKCTT	8471	Pneumonia	123	Chest infection
4	HKCTT	8471	Pneumonia	---	Pneumonia

# Congenital spastic paralysis (cerebral)

v2001

G80.0 Spastic cerebral palsy  
Congenital spastic paralysis (cerebral)

G80.1 Spastic diplegia

G80.2 Infantile hemiplegia

G80.3 Dyskinetic cerebral palsy

Athetoid cerebral palsy

v2010

**G80.0 Spastic quadriplegic cerebral palsy**  
Spastic tetraplegic cerebral palsy

**G80.1 Spastic diplegic cerebral palsy**  
Congenital spastic paralysis (cerebral)  
Spastic cerebral palsy NOS

**G80.2 Spastic hemiplegic cerebral palsy**

**G80.3 Dyskinetic cerebral palsy**  
Athetoid cerebral palsy



# Problem in eHR Viewer

黃刑瑞 WONG, ING SHEU  
HKIC : UH9773127 DOB : 04-Jan-1887 Age : 126 years Sex : M Details ► Allergy & ADR

醫健通 ehealth

All HA Non-HA Legend

**Problem**

Date	Description	Institution
10-Feb-2012	Diabetes Mellitus	AHN
10-Feb-2012	Type II DM with background retinopathy	AHN
10-Feb-2012	Type II DM with over nephropathy	AHN
04-Jan-2004	Hepatitis	Hospital A
04-Jan-2004	Portal hypertension	Hospital A
04-Jan-2003	Acute upper respiratory infection	Hospital A
09-Jan-2002	Chest infection	CMC
01-Feb-1999	Viral hepatitis	Dr Wong
01-Jan-1993	Acute URTI	Dr Wong

1. Group by Grouping Term ID  
2. eHR Description of Grouping Term ID is shown  
3. Only extrinsic data from latest progress is shown

Dispensing History

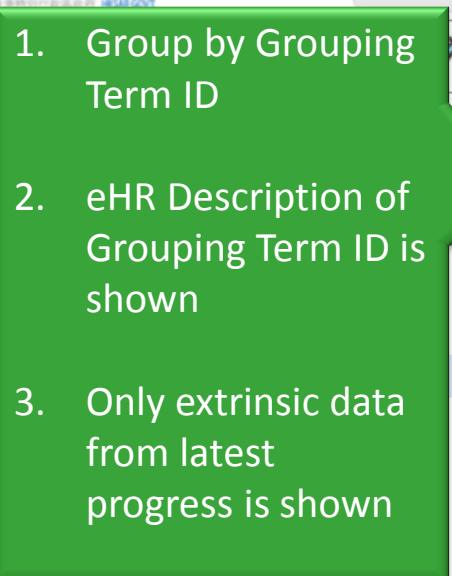
Radiology Record

Fluoroscopy

Computed Tomography

PET / CT Fusion Imaging

Immunisation Record



# Problem in eHR Viewer Detail View

黃刑瑞 WONG, ING SHEU  
HKIC : UH9773127      DOB : 04-Jan-1887      Age : 12

All HA Non-HA Legend

**Problem**

Date	Description	Institution
▼ Hepatitis		
04-Jan-2004	Chronic viral hepatitis B infection	Hospital A
04-Jan-2004	Portal hypertension	Hospital A
09-Sep-2002	Chronic type B viral hepatitis	Dr Ho
09-Sep-2002	Ascites	Dr Ho
04-Dec-2000	Alcoholic hepatitis	Hospital C
03-Mar-1999	Chronic viral hepatitis B infection	Hospital B
03-Mar-1999	Portal hypertension	Hospital B
04-Feb-1999	Viral hepatitis	Dr Chan

Show Local Description

Allergy & ADR

**Clinical Note & Summary**

- Clinical Note & Summary
- Referral
- Birth Record

**Encounter**

**Problem & Procedure**

- Problem / Diagnosis
- Procedure
- Investigation Report

**Medication**

- Prescribing History
- Dispensing History

**Radiology Record**

- Fluoroscopy
- Computed Tomography
- PET / CT Fusion Imaging

**Immunisation Record**

# HKCTT

For  
Grouping  
in eHR  
Viewer

Date	Provider	Description	Code	System	Term ID	Term ID
3 Jan 2004	Hospital A	Chronic viral hepatitis B infection	B18.1	ICD10	1008	41635 Hepatitis
9 Sep 2002	Dr Ho	Chronic type B viral hepatitis	61977001	SNOMED CT	1008	
4 Dec 2000	Hospital C	Alcoholic hepatitis	K70.1	ICD10	29392	
3 Mar 1999	Hospital B	Chronic viral hepatitis B infection	1008	HKCTT	1008	
4 Feb 1999	Dr Chan	Viral hepatitis	D72	ICPC2	1023	
1 Feb 1999	Dr Wong	Viral hepatitis	V hep	---	---	

Local Description



# Data Retrieval with ICD 10

## K25.4 Chronic or Unspecified Gastric Ulcer with Haemorrhage

Term ID	Concept Description ▲	ICD10Dx	ICD10Dx Asso
8838	Bleeding chronic gastric ulcer with shock	<u>K25.4</u>	<u>R57.1</u>
9010	Bleeding gastric erosion	<u>K25.4</u>	
8841	Bleeding gastric ulcer	<u>K25.4</u>	
8839	Bleeding gastric ulcer and duodenal ulcer	<u>K25.4</u>	<u>K26.4</u>
8840	Bleeding prepyloric ulcer	<u>K25.4</u>	
8836	Chronic or unspecified gastric ulcer with haemorrhage	<u>K25.4</u>	
8842	Chronic or unspecified gastric ulcer with haemorrhage, with obstruction	<u>K25.4</u>	<u>K31.8</u>
8837	Gastric ulcer, chronic, with haemorrhage	<u>K25.4</u>	



K25

## Gastric ulcer

[See at the beginning of this block for subdivisions]

**Incl.:** erosion (acute) of stomach

ulcer (peptic):

- pylorus
- stomach

Use additional external cause code (Chapter XX), if desired, to identify drug, if drug-induced.

**Excl.:** acute haemorrhagic erosive gastritis ([K29.0](#))

peptic ulcer NOS ([K27.-](#))

The following fourth-character subdivisions are for use with categories K25-K28:

**.0 Acute with haemorrhage**

**.1 Acute with perforation**

**.2 Acute with both haemorrhage and perforation**

**.3 Acute without haemorrhage or perforation**

**.4 Chronic or unspecified with haemorrhage**

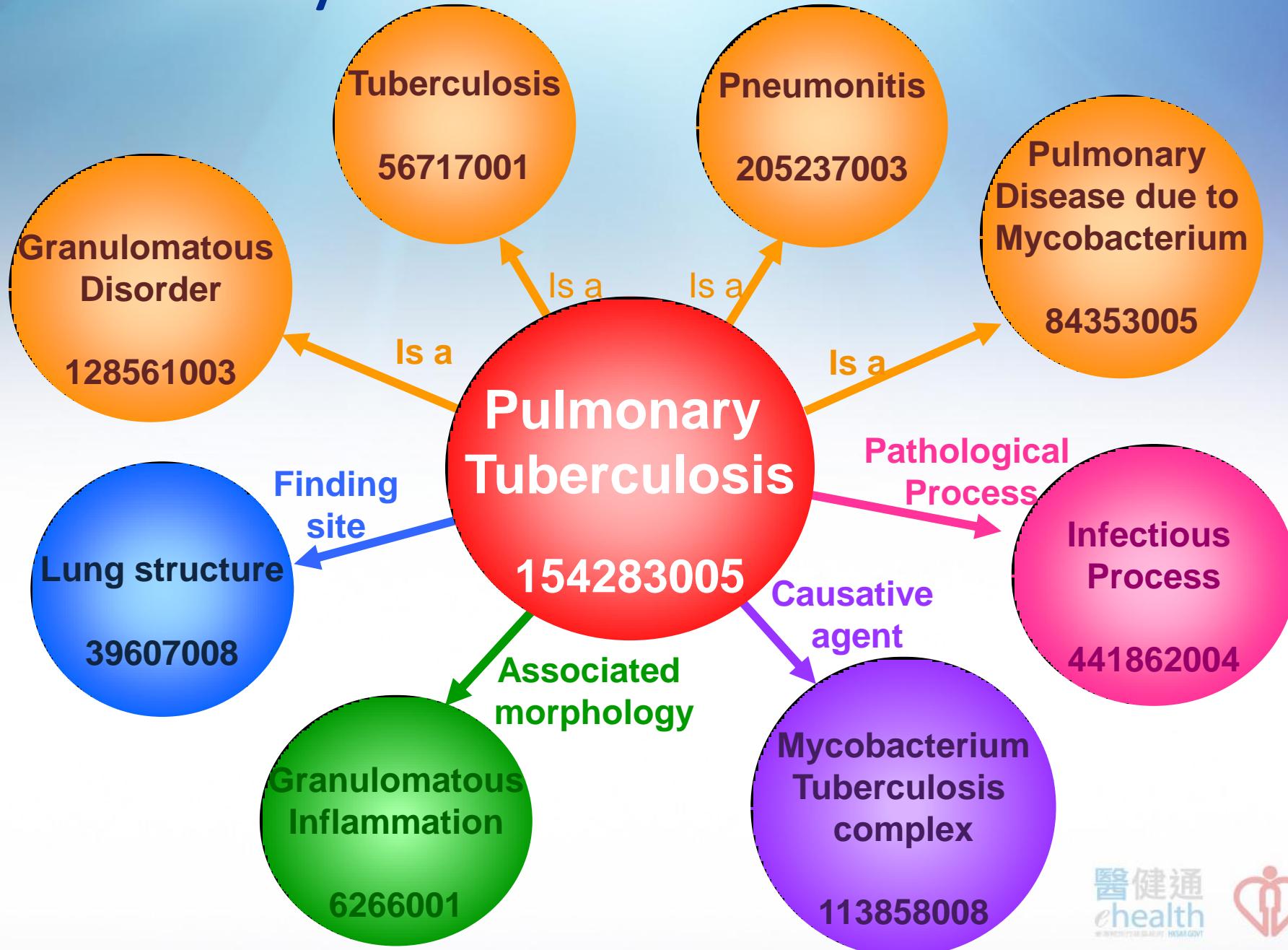
**.5 Chronic or unspecified with perforation**

**.6 Chronic or unspecified with both haemorrhage and perforation**

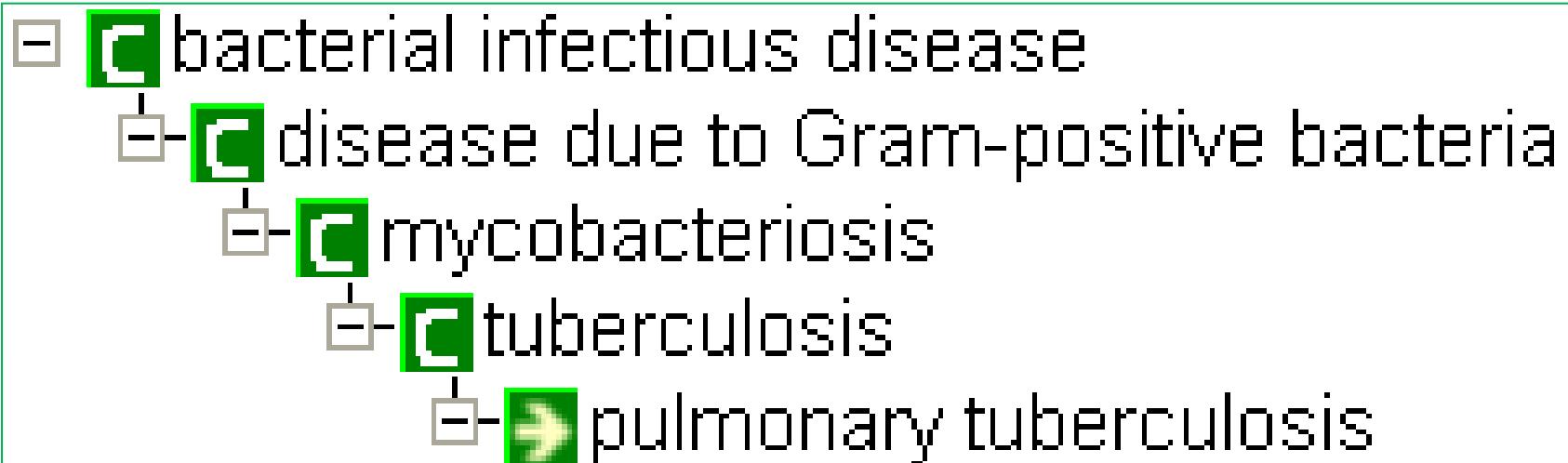
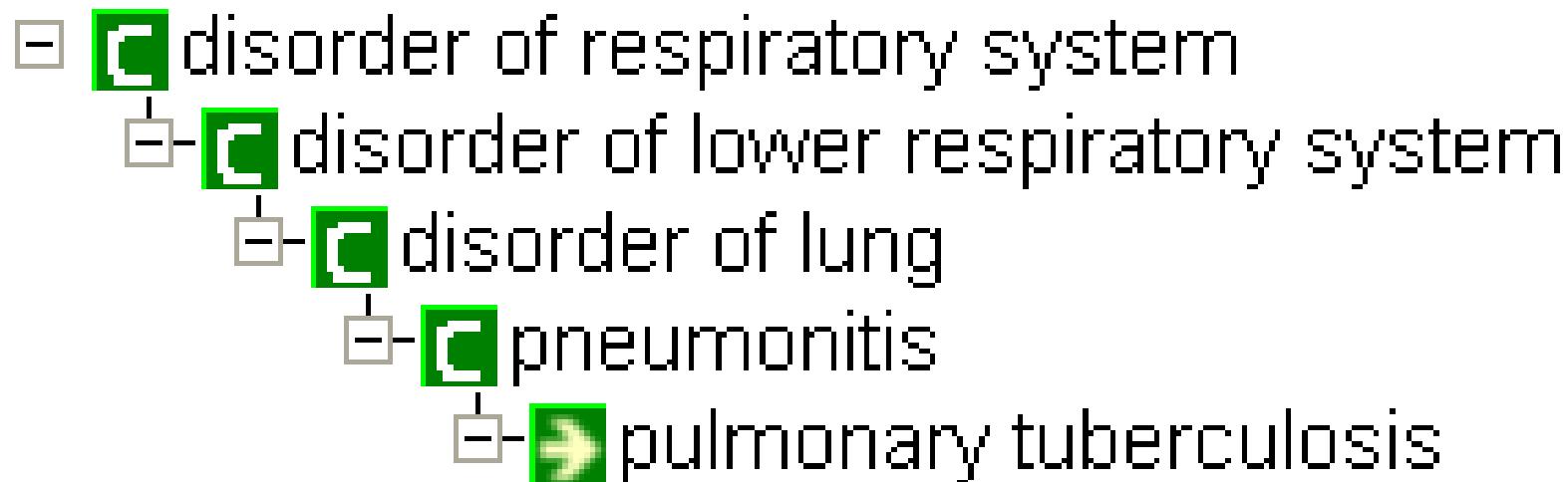
**.7 Chronic without haemorrhage or perforation**

**.9 Unspecified as acute or chronic, without haemorrhage or perforation**

# Pulmonary Tuberculosis in SNOMED CT



# Multi-hierarchical Search



# HKCTT in Practice

- Support clinical documentation
  - Alias
  - Frequency count
- Facilitate decision support
- Provide organised data in eHR Viewer
- Assist data retrieval/reporting



# Management of HKCTT

- Governance
  - eHR IS CG, eHR IS DGs, HKCTT EG
- Development
  - Terminology management principles & editorial rules
  - Special handle : nonspecific / vague terms
- Maintenance
  - Information Architecture Management System
  - Quality management
  - Feedback mechanism
  - Regular update
  - Distribution



# 3 ways to Adopt HKCTT

	HKCTT App	HKCTT Offline	HKCTT Core
Serving	On-ramp / Adaptation	Provider's system	All HCPs
HKCTT Content	Y	Y	Y (view <u>±</u> download)
Terminology Engine	Y	Y	
Search Panel	Y		

# Tips for Terminology Management

- Meaningless identifier to allow expansion
- Unique meaning
- To facilitate searching
  - Synonyms
  - Common list
- Mapping
  - Check rules of individual terminologies
  - What you see, what you get
  - Must be validated by professionals
- Keep updating

## Cimino's Desiderata

- Content
- Concept oriented
- Concept permanence
- Nonsemantic concept identifier
- Polyhierarchy
- Formal definitions
- Reject "not elsewhere classified"
- Multiple granularities
- Multiple consistent views
- Representing context
- Graceful evolution
- Recognize redundancy

# Summary

- Medical terminology
  - Fundamental & essential for management of modern medicine
  - Complex, highly specialised
  - A global effort
- Management of medical terminology
  - Labour intensive
  - Requires specialised management toolset
  - Ongoing activity

# Thank You

